

SHORT COMMUNICATION

GOLDEN EAGLES TAKE UP TERRITORIES ABANDONED BY BONELLI'S EAGLES IN NORTHERN SPAIN

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In some areas of mediterranean Europe, Golden Eagles (*Aquila chrysaetos*) and Bonelli's Eagles (*Hieraetus fasciatus*) coexist. In Navarra, in northern Spain, the eagles are non-migratory and maintain exclusive territories spacing themselves uniformly (Fernández and Insausti 1986, Donázar et al. 1989). Our study area (10,420 km²) extended from the Pyrenees to the Ebro valley and lies at the northern limit of the range of Bonelli's Eagles. Here, the breeding of all pairs of Bonelli's Eagles (Insausti 1986) and Golden Eagles (Fernández 1988) has been monitored annually since 1982. Over this period we have documented a marked decline in the population of Bonelli's Eagles. From seven pairs in 1970 the number dropped to two breeding pairs in 1989. In contrast, Golden Eagles have maintained a healthy population. Thirty-three pairs nested in 1982 and this number has increased by 6.1% in the last seven years (Fernández 1988).

Of the five pairs of Bonelli's Eagles lost, two disappeared through robbery at the nest and shooting of the adults in 1972 and 1978 (Insausti 1986); one through electrocution of both adults in 1989 and the remaining two (in 1976 and 1987) for unknown causes. The territory abandoned in 1972 was taken over in 1985 by a pair of Golden Eagles, which since then has bred each year. The home range abandoned in 1978 was occupied by Golden Eagles in 1984. The Golden Eagles used one of the old nests of Bonelli's Eagles. A third home range probably is being colonized. An adult Golden Eagle has been observed in the area in 1988 and 1989, but was not breeding. The more recently abandoned territories have remained unoccupied.

Substitution of territories between different species of raptors is a relatively well known occurrence (Newton 1979) and has already been reported for Golden and Bonelli's eagles (Cheylan 1973, Austruy and Cugnasse 1981, Clouet and Goar 1984). Recently interspecific competition between these two eagles has been shown by different authors (Cheylan 1973, Jordano 1981, Clouet and Goar

1984). We have shown that this competition appears to be largely based on food (Fernández and Insausti 1986) rather than nest sites (Donázar et al. 1989).

We believe that the colonization of vacated territories was passive rather than an active competitive displacement. This was suggested by the long interval during which the territories remained vacant. Interspecific competition, therefore, does not appear to be the cause of the alarming decline of Bonelli's Eagles. However, colonization of abandoned territories by Golden Eagles could be detrimental to the declining Bonelli's Eagle population by making future recolonization of abandoned areas more difficult. In this sense we could speak of a passive competitive displacement that could be contributing to the disappearance of Bonelli's Eagles from our region.

The mechanics of this displacement require further clarification. There is indirect evidence for interspecific territoriality from the uniform distribution of home ranges, and from aggressive behavior between members of both species (Fernández and Insausti 1986). Also the rapid replacement of adult Golden Eagles disappearing from the breeding population (Fernández 1988) suggests an existence of young and subadult Golden Eagle floaters. In addition, the spatial saturation by Golden Eagles (Fernández 1988) could force new pairs to use home ranges abandoned by Bonelli's Eagles. Thus the occupancy of Bonelli's Eagles' home ranges by Golden Eagles would be facilitated by the decline in the population of Bonelli's Eagles and the presence of floaters in the Golden Eagle population.

The decline of the population of Bonelli's Eagles itself appears to have diverse causes which include major changes in human land use, recent rural electrification and shooting. The high breeding productivity observed in the region (Insausti 1986) would indicate that the decline in breeding pairs is due more to low adult and juvenile survival rates than to breeding problems. Radiotracking in Catalonia, in northeast Spain, by J. Real (*pers. comm.*) indicates that electrocution and shooting are the main causes of mortality for juvenile and adult Bonelli's Eagles. Also, changes in land use could have favored a species that hunts in open areas on mammals, such as the Golden Eagle (Watson et

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al. 1987), and be detrimental to a woodland bird eater, the Bonelli's Eagle (Jordano 1981, Clouet and Goar 1984, Fernández and Insausti 1986).

RESUMEN.—Desde 1982 se viene observando en Navarra (Norte de España) una progresiva colonización por el Aguila Real de los territorios abandonados por el Aguila Perdicera. Las causas no están claras pero puede deberse a cambios rurales que perjudicarían en mayor medida al Aguila Perdicera. Aunque no se trate de un desplazamiento competitivo activo estas sustituciones pueden suponer, en un futuro, una dificultad añadida para la recuperación de la población de Aguilas Perdiceras actualmente en declive.

ACKNOWLEDGMENTS

The study was financed with help from the Environmental Service of the Navarran Government and an FPI-grant from the Basque Government. F.J. Purroy, J.A. Donazar and O. Ceballos added new perspectives on the subject. G.R. Bortolotti, and P. and L. Fasce provided a careful, critical review of the manuscript. A.M. Jones translated the paper.

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Received 29 March 1990; accepted 21 September 1990